

NOTES ON UTAH SYRPHIDÆ¹BY G. F. KNOWLTON AND H. J. PACK²

In connection with a study of the aphids occurring in the state, work toward a list of the syrphids of Utah was commenced in 1923. Mr. David G. Hall accompanied the senior author in a collecting trip over much of Utah during the summer of 1925; during this time a number of syrphids were collected. The writers are indebted to Mr. Hall for a list of Utah syrphids collected by himself and for the determination of much of the material in the Utah Agricultural Experiment Station collection. Dr. Vasco M. Tanner very kindly consented to our use of data from specimens in the collection of the Entomology Department at the Brigham Young University. The writers are also indebted to Messrs. C. H. Curran, C. T. Greene, and C. R. Jones for the determination of much of the material recorded in this list.

Family *Syrphidæ*

1. CHRYSOTOXUM DERIVATUM Walker

Dividend (Spalding³); Logan, June 1925 (Hall and Knowlton). Also collected at Black Sands Basin, Yellowstone National Park, Wyoming (Tanner).

2. CHRYSOTOXUM INTEGRUM Williston

Aspen Grove, Timpanogos, July 1926 (Tanner); La Sal Mountains, June 1927 (Tanner); Logan Canyon, June 1923 (Knowlton); Raft River Mountains, June 1928 (Beck); Parowan, August 1929 (Tanner). Also collected at Lava Hot Springs, Idaho (Beck).

3. CHRYSOTOXUM YPSILON Williston

Aspen Grove, B. Y. U. Campus, Timpanogos, July 1927 (Tanner).

4. CHRYSOGASTER BELLULA Williston

Spring Hollow in Logan Canyon, August 28, 1925 (Knowlton).

5. CHRYSOGASTER PARVA Shannon

Logan, May 2, 1923 (Knowlton); Logan Canyon, July 1925 (Hall).

¹ Contribution from the Department of Entomology, Utah Agricultural Experiment Station.

² Died January 5, 1930.

³ Unless otherwise indicated, localities listed are in Utah. Publication authorized by director February 28, 1930.

6. *PIPIZA CALIFORNICA* Davidson

St. George, July 1925 (Hall).

7. *PARAGUS BICOLOR* Fabricius

Logan, May 17, 1929 (Knowlton); St. George, July 1925 (Hall).

8. *PARAGUS TIBIALIS* Fallén

Portage, August 20, 1926 (Knowlton); Sheep Creek, Duchesne County, June 1926 (Tanner); Willard, September 10, 1925 (Knowlton). Also collected at Mesa Verde National Park, Colorado, June 1927 (Tanner).

9. *PARAGUS ANGUSTIFRONS* Loew

Riverdale, September 14, 1925 (Knowlton).

10. *CHILOSIA OCCIDENTALIS* Williston

City Creek Canyon, June 1925 (Hall and Knowlton).

11. *BACCHA LEMUR* Osten Sacken

Cedar Breaks, June 1925 (Hall and Knowlton); Duchesne, July 1926 (Tanner); Dividend, July 17 (Spalding); Indianola, June 1929 (Tanner).

12. *PYROPHÆNA OCYMI* Fabricius

Cedar City, July 1925 (Hall).

13. *PYROPHÆNA GRANDITARSUS* Förster

Brigham City, September 10, 1925 (Knowlton); Corinne, September 9, 1925 (Knowlton).

14. *PLATYCHIRUS QUADRATUS* Say

Logan Canyon, July 1925 (Hall).

15. *MELANOSTOMA CÆRULESCENS* Williston

Miner's Peak, July 11, 1919; Tony Grove Park in Logan Canyon, July 1925 (Hall).

16. *MELANOSTOMA CONCINNUM* Snow

Tony Grove Park in Logan Canyon, August 1925 (Hall).

17. *MELANOSTOMA MELLINUM* Linnæus

Lewiston, 1925 (Knowlton).

18. *MELANOSTOMA STEGNUM* Say

Logan, May 19, 1924 (Knowlton).

19. *MELANOSTOMA TIGRINUM* Williston

Logan, June 1925 (Hall).

20. *MELANOSTOMA OBSCURUM* Williston

Brigham City, September 1928 (Knowlton); Logan, June 1925 (Hall); Miner's Peak, June 11, 1919; St. George, July 1925 (Hall); Wellsville.

21. *EUPEODES BRAGGI* Jones

Madison River, Yellowstone National Park, Wyoming, July 1929 (Beck).

22. *EUPEODES VOLUCRIS* Osten Sacken

Aspen Grove, Timpanogos, August 1926 (Tanner); Bear River Bay, July 7, 1925 (Hall); Bear River City, July 1929 (Knowlton); Bluff (Rasmussen); Bountiful (Knowlton); Brigham City, September 2, 1927 (Knowlton); Cedar City, July 22, 1926 (Knowlton); Coal Creek, Deep Creek Mountains, June 1928 (Tanner); Dividend (Spalding); Glacier Lake, Timpanogos (Tanner); Indianola, June 1929 (Tanner); Logan, July 14, 1923 (Knowlton); Logan Canyon, June 24, 1925 (Hall); Moab (Call); Parowan, August 1929 (Tanner); on beets at Pleasant View, June 1928 (Knowlton); Provo (Brown and Curtis); Portage, July 20, 1927 (Knowlton); Salt Lake City, July 28, 1923 (Knowlton); Torry, June 26, 1926 (Knowlton and Titus); Wellsville Canyon, June 1926 (Brown); Widtsoe, August 1929 (Tanner); Zion National Park (Tanner and Bentley). Also collected at Kaibab Forest, Arizona, July 1927 (Call); Rim of Grand Canyon, Kaibab Forest, Arizona, 1927 (Tanner); Mesa Verde National Park, Colorado, June 1927 (Tanner); Lewis Lake, Yellowstone National Park, Wyoming, July 1929 (Tanner).

23. *LASIOPHTHICUS PYRASTRI* (Linnæus)

Aspen Grove, Timpanogos, July 1926 (Tanner); Bluff, July 1927 (Call); Logan, May 19, 1924 (Knowlton); La Sal Mountains, Mount Tuhuhnivats (Tanner); Miner's Peak, July 12, 1919; Indianola (Tanner); Murray, July 3, 1908; Provo (Tanner); Raft River Mountains, June 1928 (Tanner); Salt Lake City, June 16, 1929 (Tanner); Wellsville Canyon, June 1926 (Cottam); Zion National Park (Liddle). Also collected at Fort Bridger, Wyoming, June 1926 (Brown); Herford Ranger Station, Idaho (Tanner).

24. *SYRPHUS AMERICANUS* Wiedemann

Aspen Grove, B. Y. U. Campus, Timpanogos, July 1927 (Tanner); City Creek Canyon, June 1925 (Hall and Knowlton); Deep Creek Mountains, June 1928 (Tanner); Miner's Peak, June 11, 1919; Pine Valley (Liddle); St. George, May 26, 1919; Zion National Park, 1926 (Knowlton).

25. *SYRPHUS ARCUATUS* (Fallén)

Logan, July 1924 (Knowlton); Logan Canyon, June 1923 (Knowlton); Plain City, June 7, 1929 (Knowlton); Provo (Rowe); Wells-

ville Canyon, June 1926 (Tanner). Also collected at Mink Creek, Immigration Canyon, Idaho (Hall and Knowlton); Fort Bridger, Wyoming, June 1926 (Tanner); Lake Hotel, Yellowstone National Park, Wyoming, July 1929 (Tanner).

26. *SYRPHUS OPINATOR* Osten Sacken

Aspen Grove, B. Y. U. Campus, Timpanogos, July 1925 (Tanner); Bryce Canyon National Park, August 1929 (Tanner); numerous at Bountiful, May 8, 1929 (Knowlton); Central, June 1922 (Tanner); Far West, June 1926 (Hayward); Logan, June 6, 1922 (Knowlton), and April 18, 1915 (L. Davidson); Provo (Thomas); Raft River Mountains, June 1928 (Beck); Riverside, June 1926 (Hayward); Wellsville Canyon, June 1926 (Tanner). Also collected at Rim, Grand Canyon, Kaibab Forest, Arizona, July 1927 (Tanner); Kaibab Forest, Arizona, July 1927 (Call).

27. *SYRPHUS PERPLEXUS* Osburn

Numerous at Bountiful, May 8, 1929 (Knowlton); Woods Cross, May 8, 1929 (Knowlton).

28. *SYRPHUS RIBESII* (Linnæus)

Bear's Ears, Elk Ridge (Kartchner); Salt Lake City, 1923 (Knowlton).

29. *SYRPHUS PROTRITUS* Osten Sacken

City Creek Canyon, July 1925 (Hall).

30. *SYRPHUS PYRASTRI* Hine

Cedar Breaks, July 9, 1925 (Hall and Knowlton); Tony Grove in Logan Canyon, July 1925 (Hall).

31. *SYRPHUS WIEDEMANII* Johns

Mount Ben Lomond, 10,000 feet elevation, July 21, 1925 (Hall).

32. *ALLOGRAPTA OBLIQUA* Say

Cottonwood Canyon, July 27, 1925 (Hall and Knowlton); Logan Canyon; Parowan (Tanner).

33. *TOXOMERUS MARGINATUS* Say

Blacksmith Fork Canyon, July 17, 1925 (Hall); Bryce Canyon National Park (Rasmussen); Bluff (Tanner); on beets at Clearfield (Knowlton); Dry Lake (Knowlton); Eden, 6000 feet (Hall); Elsinore (Knowlton); Fielding (Knowlton); Glendale (Tanner); Lewiston (Knowlton); Logan (Knowlton); Parowan (Tanner); Provo (Rowe); Providence (Knowlton); Salt Lake City (Knowlton); Tremonton (Knowlton). Also collected at Rim of Grand Canyon, Kaibab Forest, Arizona, June 1927 (Tanner).

34. *TOXOMERUS GEMINATUS* Say

Corinne 1925 (Hall); Cove, August 24, 1925 (Knowlton); Logan, September 2, 1925 (Knowlton); Logan Canyon (Hall); Provo (Thomas); Wellsville, July 1925 (Hall).

35. *TOXOMERUS POLITUS* Say

Brigham, July 1925 (Hall); Wellsville.

36. *TOXOMERUS BOSCI* Macquart

Blacksmith Fork Canyon, July 17, 1925 (Hall).

37. *SPHÆROPHORIA CYLINDRICA* Say

Blacksmith Fork Canyon, 6000 feet elevation, July 17, 1925 (Hall); Far West (Tanner); Lake Town Canyon, June 1926 (Hayward); Kaysville, June 1926 (Tanner); Logan, June 4, 1923 (Knowlton); Logan Meadows, August 20, 1923 (Knowlton); Lewiston, August 20, 1925 (Knowlton); Paradise, August 18, 1925 (Knowlton). Also collected at Fort Bridger, Wyoming, June 1926 (Hayward and Brown).

38. *SPHÆROPHORIA SCRIPTA* Linnæus

Bear River City, September 9, 1929 (Knowlton); Blacksmith Fork Canyon, July 17, 1925 (Hall and Knowlton).

39. *SPHÆROPHORIA STRIGOTA* Staegman

Blacksmith Fork Canyon, July 17, 1925 (Hall).

40. *SPHÆROPHORIA INTERRUPTA* Jones

Provo (Thomas). Also collected at Mammoth Hot Springs, Yellowstone National Park, July 1929 (Beck); Fort Bridger, Wyoming, June 1926 (Brown).

41. *COPESTYLUM MARGINATUM* Say

Dividend, May 17 (Spalding).

42. *VOLUCELLA COMSTOCKI* Williston

Salina, June 28, 1927 (Knowlton).

43. *VOLUCELLA ISABELLINA* Williston

Salt Lake City, September 14, 1925 (Knowlton).

44. *VOLUCELLA SANGUINEA* Williston

Aspen Grove, B. Y. U. Campus, Timpanogos, July 1926 (Tanner); Logan Canyon, July 1926 (Knowlton). Also collected at Mink Creek in Immigration Canyon, Idaho, 1925 (Hall and Knowlton); Mammoth Hot Springs, Yellowstone National Park, Wyoming, July 1929 (Beck).

45. *VOLUCELLA SATUR* Osten Sacken

Copper Mountains, five miles south of Lucin, June 1928 (Tanner).

46. *SERICOMYIA CHALCOPYGA* Loew

Common in Utah (Hall).

47. *ARCTOPHILA FLAGRANS* Osten Sacken

Provo Canyon, July 1926 (Spalding).

48. *ERISTALIS FLAVIPES* Walker

Logan Canyon, July 2, 1925 (Hall and Knowlton).

49. *ERISTALIS LATIFRONS* Loew

Cedar City, July 3, 1919; Colton (Rasmussen); Eureka, June 19, 1920 (Spalding); Logan, July 1923 (Knowlton); Logan Canyon, 1923 (Knowlton); Miner's Peak, July 13, 1919; Moab (Rasmussen); Raft River Mountains, June 1928 (Tanner); St. George, May 30, 1919; Zion National Park (Tanner). Also collected at Franklin, Idaho, May 24, 1923 (Knowlton); Fort Bridger, Wyoming, June 1926 (Hayward).

50. *ERISTALIS MONTANUS* Williston

Aspen Grove, B. Y. U. Campus, Timpanogos (Tanner); Hyrum, July 1928 (Knowlton); Logan, August 8 and 20, 1923 (Knowlton).

51. *ERISTALIS SAXORUM* Wiedemann

Provo (Thomas). Also collected at Black Sands Basin, Yellowstone National Park, Wyoming, July 1929 (Tanner).

52. *ERISTALIS TEMPORALIS* Thomson

Common at Bountiful, May 8, 1929 (Knowlton); Woods Cross, May 8, 1929 (Knowlton).

53. *ERISTALIS TENAX* Linnæus

Aspen Grove, B. Y. U. Campus, Timpanogos, July 1926 (Tanner); Bluff (Rasmussen); Cedar City, June 30, 1919; Clover, July 6, 1926 (Knowlton); Dividend, June 1924 (Spalding); Logan, June 9, 1923 (Knowlton); Logan Canyon, August 10, 1925 (Knowlton); Tony Grove, Logan Canyon, July 1925 (Hall); Park City (Olsen); Parowan (Tanner); Provo (Tanner); Trenton, September 15, 1926 (Knowlton); Wellsville Canyon, June 1926 (Tanner). Also collected at Mesa Verde National Park, Colorado (Rasmussen); Moscow, Idaho (Sudweeks).

54. *ERISTALIS TRANSVERSUS* Wiedemann

Logan, July 1925 (Hall).

55. *ERISTALIS BRAUSI* Williston

Cache Junction, 1912 (Hagan); Logan, June 1923 (Knowlton); Trenton, September 5, 1926 (Knowlton). Also collected at Fort Bridger, Wyoming, June 1926 (Brown and Hayward).

56. *ERISTALIS ARBUSTORUM* Linnæus

Aspen Grove, B. Y. U. Campus, Timpanogos, August 1927 (Tanner); Hurricane, July 1925 (Hall); Kaysville, June 1926 (Hayward); Logan, April 18, 1909; Salt Lake City, July 1925 (Hall); Reserve Creek, Raft River Mountains, June 1928 (Tanner). Also collected at Fort Bridger, Wyoming, June 1926 (Hayward).

57. *ERISTALIS ANTHOPHORINUS* Fallén

Dividend, April 29 (Spalding); Vinyard, April 29 (Spalding).

58. *ERISTALIS OBSCURUS* Loew

Logan Canyon, June 1925 (Hall).

59. *ERISTALIS ÆNEUS* Scopoli

Provo (Tanner).

60. *ERISTALIS DIMIDATUS* Wiedemann

Utah, May 4, 1920 (Spalding).

61. *ERISTALIS MEIGENII* Wiedemann

La Sal Mountains (Tanner); Parowan, August 1920 (Tanner). Also collected at Lehman Cave, Mount Wheeler, Nevada (Tanner); Mesa Verde National Park, Colorado, June 1927 (Tanner).

62. *HELOPHILUS LATIFRONS* Loew

La Sal, June 1927 (Kartchner); Logan, May 15, 1923 (Knowlton), July 4, 1923 (Knowlton), July 1925 (Hall); Logan Meadows, July 3, 1929 (Knowlton); Trenton, September 15, 1926 (Knowlton). Also collected at Driggs, Idaho, June 1928 (Kartchner); Fort Bridger, Wyoming, June 1926 (Tanner and Cottam).

63. *HELOPHILUS SIMILIS* Macquart

Aspen Grove, B. Y. U. Campus, Timpanogos, July 1927 (Tanner); Brigham City (Knowlton); Lewiston (Knowlton); Logan, July 1925 (Knowlton); Logan Peak, July 1925 (Hall); Salt Lake City, 1926 (Knowlton).

64. *HELOPHILUS FASCIATUS* Walker

Lewiston, June 5, 1929 (Knowlton).

65. *ASEMOSYRPHUS MEXICANUS* Macquart

Tony Grove, Logan Canyon, July 1925 (Hall).

66. *SYRITTA PIPIENS* Linnæus

Blacksmith Fork Canyon, July 17, 1925 (Hall); Cedar City, June 28, 1919; Eden, July 1925 (Knowlton); Gunnison, October 1903; Hooper, July 1928 (Knowlton); Hyrum, July 1929 (Knowlton); Lewiston, October 25, 1925 (Knowlton); Little Salt Lake, June 13, 1919; Logan, June 6, 1923 (Knowlton); Ogden, 1928 (Knowlton);

Parowan, July 16, 1919; Richfield, July 1926 (Knowlton); Richmond, June 1929 (Knowlton).

67. *XYLOTA BATON* Walker

Utah.

68. *XYLOTA FLAVITIBIA* Williston

Mesa Verde National Park, Colorado, June 1927 (Tanner).

69. *EUMERUS STRIGATUS* Fallén

Lewiston, August 24, 1925 (Knowlton); Wellsville (R. Christensen).

70. *SPILOMYIA INTERRUPTA* Williston

Aspen Grove, Timpanogos, July 1927 (Tanner); Provo (Tanner).

Note: Mr. Knowlton authorizes me to include six additional species taken by me in Utah in July 1922. *Chilosia petulca* Will., Vivian Park, Park City; *Syrphus intrudens* O. S., Mount Timpanogos; *Mesogramma marginata* Say, White Pine Lake, above Logan; *Sphaerophoria sulphuripes* Thom., Salt Lake City; *Polydontomyia curvipes* Wied., Salt Lake City.—E. P. Van Duzee.

THE SYNCHRONIZATION OF LIFE HISTORIES

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In the temperate regions, where insects have been most extensively studied, there is in nearly all cases a very definite synchronization in the development associated with the winter rest. This is so evident that we all expect an insect in the spring to appear suddenly and all the individuals to be in the same stage of development, while in the fall there may be specimens in different stages of development, and if more than one brood, we expect to find it in every stage. In some species there is a total mortality in the fall for every stage but one, and in this surviving stage the growth during the cooler weather, either fall or spring, brings most, or all, to a molt or other point of physiological reversal which they cannot pass till the warmer weather of spring. These two causes, acting together, brings the species to a very complete synchronization.

The fundamental thing in the seasonal adjustment of an insect is the mechanism for this developmental synchronization. Below I have attempted to tabulate the outstanding features of this process: